Hudson River PCBs Superfund Site
New York

Response to Peer Review Comments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

April 14, 2004

To All Interested Parties:

The U.S. Environmental Protection Agency (EPA) is pleased to release this Response to Peer Review Comments on the Agency's October 2003 Draft Engineering Performance Standards – Peer Review Copy, for the Hudson River PCBs Superfund Site.

On January 27-29, 2004, EPA, through its contractor, Eastern Research Group, convened a panel of independent scientific experts to conduct a peer review of the October 2003 Draft Engineering Performance Standards – Peer Review Copy, for the Hudson River PCBs Superfund Site. Consistent with the Agency's Peer Review Handbook, this Response to Peer Review Comments describes how EPA incorporated the peer review comments or provides the technical rationale for not incorporating a comment.

In conjunction with this Response to Peer Review Comments, EPA is issuing the final Engineering Performance Standards.

If you need additional information regarding the Engineering Performance Standards or the Hudson River PCBs Site in general, please contact Leo Rosales, Community Involvement Coordinator, at the Hudson River Field Office (tel. 518-747-4389 or toll-free 866-615-6490).

Sincerely yours,

John S Frisco

for George Pavlou, Director
Emergency and Remedial Response Division

Response to Peer Review Main Points
On the October 2003 Draft Engineering Performance Standards – Peer Review Copy

INTRODUCTION

On January 27-29, 2004, the U.S. Environmental Protection Agency (USEPA), through its contractor, Eastern Research Group (ERG), convened a panel of independent scientific experts to conduct a peer review of the October 2003 Draft Engineering Performance Standards – Peer Review Copy for the Hudson River PCBs Superfund Site. This peer review was consistent with the Agency's Peer Review Handbook (USEPA, 2000). As part of this peer review, the panel was provided with USEPA's responses to public comments received on the May 2003 version of the Draft Engineering Performance Standards and other relevant information. The peer reviewers were asked to respond to USEPA's charge questions, which covered the major components of the Draft Engineering Performance Standards. The specific charge questions and information about the peer review are presented in the "Report on the Peer Review of the U.S. Environmental Protection Agency's Draft Engineering Performance Standards – Peer Review Copy for the Hudson River PCBs Superfund Site" (ERG, 2004) (the "Peer Review Report").

This Response to Peer Review Comments describes how USEPA incorporated the peer review comments or provides the technical rationale for not incorporating a comment. This response addresses the peer reviewers' overall recommendations contained in the Executive Summary of ERG's Peer Review Report. A summary of the major changes to the standards following peer review is provided in Attachment A.

In conjunction with this Response to Peer Review Comments, USEPA is issuing the final Engineering Performance Standards. USEPA will apply the final Engineering Performance Standards to Phase 1 of the project, which is the first year of dredging, subject to applicable refinements as outlined in the final Engineering Performance Standards to reflect final dredge volumes and the results of the Baseline Monitoring Program. As required by the ROD, USEPA will evaluate the data collected during Phase 1 and will hold a peer review on the Agency's evaluation of the Phase 1 data before issuing final Engineering Performance Standards for Phase 2, which is the remainder of the dredging project (*i.e.*, the next five years).

In light of the comments received during this Peer Review on the draft Engineering Performance Standards, USEPA has revised the Engineering Performance Standards document to improve its clarity and readability. The primary change is that there are now five volumes rather than four. The statement of each of the standards has been moved to a common location in a new Volume 1, along with new sections describing the interactions among the standards and a plan for the Phase 1 evaluation. The technical basis and implementation discussions for each standard remain in separate volumes (Resuspension in Volume 2, Residuals in Volume 3, and Productivity in Volume 4). Volume 5 contains the case studies used in developing all three standards. A comparison of the structures of the October 2003 and the April 2004 documents is provided in Attachment B.

RESPONSES

Main Points on the Resuspension Standard

Charge Question 1: Framework

The Resuspension Standard was developed with a routine (i.e., baseline condition) water quality monitoring plan and three tiered action levels (Evaluation, Concern, and Control) leading up to a maximum allowable concentration of PCBs in river water. Exceedence of an action level would trigger additional monitoring requirements beyond the routine monitoring, as well as operational or engineering steps (studies and operational or engineering improvements and, if necessary, temporary halting of operations). The Resuspension Standard was developed with this framework to accommodate the project need for both protection and production (i.e. upon an exceedence of an action level, appropriate steps can be taken to identify and address remediation-related problems before dredging operations would need to be halted temporarily) (see, for example, Section 2.3: Rationale for the Standard). Please comment on whether this framework provides a reasonable approach for developing the Resuspension Standard.

Comment 1: The general framework is logical and well-thought out, however, this standard may have too many levels. USEPA should consider simplifying or reducing the number of action levels, primarily to reflect those necessary to evaluate compliance.

Response 1: The Resuspension Performance Standard was originally structured with three action levels (Evaluation, Concern, Control) plus the Threshold Standard to accommodate a range of possible in-river conditions and the data to be collected during both the Phase 1 and the Phase 2 dredging operations. In response to this comment and other comments from the peer reviewers (see, for example, comment no. 5 recommending that tPCB data be collected in the near field), USEPA is separating out several "special studies." This revision allows the Agency to simplify the Resuspension Standard by reducing the number of action levels in both Phase 1 and Phase 2. For Phase 1, the levels now include Evaluation and Control Levels and the Threshold. While the Evaluation Level and Threshold remain the same, the new Control Level combines the criteria and time frames of the former Concern Level with the annual load criterion and engineering requirements of the former Control Level. For Phase 2, the standard will also include two action levels (to be configured based on Phase 1 data) and the Threshold. The text of the Resuspension Standard has been revised accordingly (see Vol. 1, Sections 2.1 and 6.2 of the final Engineering Performance Standards).

Comment 2: The panel recommends that the resuspension standard consider and address all relevant Water Quality Standards. This would include the assimilative capacity for PCBs in the Hudson River.

Response 2: As noted in Section 2.1.1 of the draft Resuspension Standard, in the Record of Decision USEPA identified several federal and state requirements for water quality that are applicable or relevant and appropriate requirements (ARARs) for the Site, and these ARARs were considered in the development of the Resuspension Standard. In the final Resuspension Standard, USEPA has clarified Section 2.1 (now Vol. 2, Section 1.0) to identify which water quality standards were waived due to the technical impracticability of attaining those standards in a reasonable time frame (see, ROD, pp. 76-77). Similarly, USEPA has clarified in Section 2.3.1.1 (Vol. 2, Section 3.1.1 of the final Resuspension Standard) that the 500 ng/L water quality standard is the only water quality standard that is not exceeded in the Upper Hudson on a routine basis under baseline (pre-dredging) conditions; thus, the MCL of 500 ng/L Total PCBs is the only water quality standard that is meaningful as a resuspension threshold standard.

Comment 3: For the long-term protection of the river, the dredging-related export should not exceed 650 Kg of total PCBs over the life of project as the upper bound limit. This objective should be clearly identified in the framework as well as the means by which it will be achieved

Response 3: In Section 2.3.1.2 (p. 51), the draft Resuspension Performance Standard stated, "…the value of 600 g/day has been selected as the primary load criterion. 600 g/day is equivalent to 650 kg load loss over the entire remediation and 65 kg in Phase 1 assuming half the targeted production rate will be achieved." In the final Resuspension Standard (Vol. 2, Section 3.1.1.2), USEPA has clarified that the 650 kg Total PCBs and 220 kg Tri+ PCBs load limits are derived from review of the model predictions and will be measured indirectly through the 600 g/day Total PCBs and 200 g/day Tri+ PCB load limits.

Charge Question 2: Near-Field Analyses

Development of the Resuspension Standard considered the potential effects of resuspension in the near-field and in the far-field[1] (see, Section 2.1.2: Definitions). The near-field work was

1 The far-field work was performed to evaluate the long-term effects of dredging on PCB concentrations in the water column and in fish tissue of the Upper and Mid-Hudson. The linked fate and transport and bioaccumulation models of the Upper Hudson (HUDTOX and FISHRAND, respectively), which were used to evaluate far-field

performed to help identify the locations of the near-field water column monitoring stations, to estimate the loss from the dredge, to estimate the nature of the release (i.e., dissolved vs. suspended) to provide an estimate of the solids transported into the far-field, and to estimate the effects of settled material on PCB concentrations in near-field sediment. Relevant sections of the document include, but are not limited to, Section 2.2.7: Near-Field Modeling, Section 2.2.8: Relationship Among the Resuspension Production, Release and Export Rates, and Attachment D: Modeling Analysis.

Please comment on the technical adequacy of the near-field analyses, in particular the linkage from the resuspension production rate (at the site of dredging), to the resuspension release rate (reflecting PCB transport in the water column in the immediate vicinity of the dredging operations) and finally to the resuspension export rate (essentially equilibrium conditions reflecting long-distance transport of PCBs in the water column).

Comment 4: The panel supports the use of the near-field analysis during Phase 1 with the goal of acquiring sufficient information to simplify and streamline objectives for Phase 2.

Response 4: Comment acknowledged. USEPA expects that the Agency's evaluation of the Phase 1 data will support simplifying and streamlining the Resuspension Standard for Phase 2, particularly with respect to the use of suspended solid levels to indicate unacceptably high PCB releases and to reduce the number of monitoring stations around each dredging operation.

Comment 5: The panel recommends that, during Phase 1, total PCB data be collected in the near-field. If data collected in Phase 1 demonstrates a relationship between turbidity, TSS, and total PCB, then the Phase 2 standard would be modified accordingly.

Response 5: In light of this recommendation, USEPA has revised the Resuspension Standard to require three special studies in the near field, as follows:

1. Near-field PCB Release Mechanism. This study is intended to determine the nature of release (resuspension particle-based or dissolved phase) and allows elimination of split-phase sampling at the far-field monitoring stations.
2. Development of a semi-quantitative relationship between TSS and a surrogate real-time measurement (bench-scale). This study will develop a bench-scale correlation between TSS and a surrogate for use during the remediation. For the near field, turbidity is expected to be a suitable surrogate. (For the far-field, a laser particle method will also be

effects, as well as the input parameters used to evaluate the long-term effects on human health and ecological receptors, were the subject of prior peer reviews. As such, they are not the subjects of this peer review.

assessed since the turbidity signal there may be difficult to distinguish from baseline conditions.)

3. Development of a semi-quantitative relationship between TSS and a surrogate real-time measurement (full-scale). The full scale study will implement and maintain a semi-quantitative relationship between TSS and a surrogate. Implementation of real-time monitoring will only be required at the near-field stations and the nearest downstream far-field station. TSS samples will be collected periodically (one/day at each station) and used to confirm if the surrogate and the bench-scale derived relationship predict, with a 95 percent level of confidence, that the actual TSS concentrations are below the Evaluation Level criteria for TSS.

USEPA expects that the site-specific data from these special studies will provide the technical support for simplifying and streamlining the Resuspension Standard by requiring only whole water samples in the far-field and by using suspended solid levels as a measure of unacceptable PCB levels in the near-field (and possibly in the far-field as well). The Resuspension Standard has been revised to include DQOs and scopes of work for these two special studies (see Vol. 1, Sections 5.1 & 5.2 and Vol. 2, Sections 4.4.1 & 4.4.2 of the final Engineering Performance Standards).

Comment 6: Some of the panel recommends adding best management practices (BMP) guidelines for controlling solids losses during remediation and including near-field turbidity monitoring with an upstream comparison.

Response 6: In developing the draft Resuspension Standard, USEPA considered the use of best management practice (BMP) guidelines for controlling solids losses during remediation. With a single exception (discussed below), USEPA decided not to include such BMP guidelines in the Resuspension Standard because they might unduly constrain the design prior to the selection of equipment and thereby reduce the opportunities for innovation in the design. USEPA determined that it was preferable for BMP guidelines, in general, to be developed as part of the engineering design, when site-specific and equipment-specific information can be properly evaluated.

In response to this comment, text has been added to Vol. 2, Section 3.1.1 of the final

Resuspension Standard to explain why BMPs were not selected as the basis of the standard. Text has also been added to Vol. 2, Section 3.1.1.2 to identify the one criterion that is related to BMPs. This criterion is the 300 g/day limit on Total PCBs, which is derived from a multiple of the best estimate of releases from the dredging operations.

Comment 7: Some of the panel feels that unacceptable downstream turbidity levels should initiate a response other than monitoring, preferably an action by the remedial operation to address the high turbidity level.

Response 7: Comment acknowledged. Special studies will be conducted at bench scale and during Phase 1 at full scale to determine if there is a level of suspended solids that indicates an unacceptable PCB release. If found, this level of suspended solids may be used to require actions to control an unacceptable PCB release. At present, however, there are no site-specific data to reliably define levels of suspended solids or turbidity that correspond to an unacceptable release of PCBs.

Comment 8: In general, there was consensus that the models were well formulated and applied and made good use of existing data. Monitoring will help clarify future direction.

Response 8: Comment acknowledged.

Charge Question 3: Evaluation Level

The Evaluation Level of the Resuspension Standard can be reached by exceeding criteria for net (i.e., over baseline) PCB load (mass loss) measured at far-field locations or criteria for net suspended solids concentrations measured at either near-field or far-field locations (see, Table 1-1). The Evaluation Level was developed specifically for Phase 1 to provide the site-specific information necessary to understand the mechanisms of PCBs release due to dredging in the Upper Hudson, which in turn is needed to guide the selection of appropriate engineering controls, as necessary. As stated in the Resuspension Standard, USEPA anticipates that sufficient data may be collected in Phase 1 to justify eliminating the Evaluation Level in Phase 2. Also, the Evaluation Level is well above the best estimate of dredging release alone. Some of the public comments that USEPA received suggested that the dredging operations should not be allowed to increase PCB concentrations in the water column above baseline conditions (i.e., that the Evaluation Level should be the threshold level that results in the temporary halting of dredging). Other comments suggested that the requirements of the Evaluation Level and Concern Level should be reduced and combined into one level prior to the Phase 1 dredging.

Relevant sections of the document include, but are not limited to Section 3.1.1: Evaluation Level).

Please comment on the appropriateness of the Evaluation Level as a component of the standard applied to Phase 1.

Comment 9: The panel is split on elimination of the Evaluation Level but overall recommends consideration of blending levels in Phase 2.

<u>**Response 9:** As noted in the responses to comments 1 and 5, above, USEPA is separating out several "special studies," which allows the Agency to simplify and streamline the Resuspension Standard by reducing the number of action levels in both Phase1 and Phase 2. For Phase 1, the levels now include Evaluation and Control Levels and the Threshold. While the Evaluation Level and Threshold remain the same, the new Control Level combines the criteria and time frames of the former Concern Level with the annual load criterion and engineering requirements of the former Control Level. For Phase 2, the standard will also include two action levels (to be configured based on Phase 1 data) and the Threshold. (see Vol. 1, Section 2.1, Section 6.2, and Table 2-1, of the final Engineering Performance Standards).</u>

Charge Question 4: Resuspension Threshold

Under the Resuspension Standard, the maximum allowable concentration (*i.e.*, threshold) in the water column is 500 ng/L Total PCBs, which is the maximum contaminant level (MCL) for potable water under the federal Safe Drinking Water Act. This threshold concentration was selected in consideration of the goals of the cleanup, which include protecting downstream public water supplies that draw from the river, and minimizing the long-term transport of PCBs in the river, both from one section of the Upper Hudson to another and from the Upper Hudson to the Lower Hudson. Relevant sections of the document include, but are not limited to, Section 2.2.9: Review of Applicable or Relevant and Appropriate Requirements, Section 2.3.1: Development of Basic Goals and Resuspension Criteria. The threshold addresses the *resuspension export rate*, which describes the rate of PCB mass transported in the water column when particle settling is unlikely to further reduce the level of PCBs in the water column (see, Section 2.1.2: Definitions). The Resuspension Standard requires that the threshold be applied to the nearest far-field sampling station that is at least 1 mile away. Moreover, to reduce the possibility that a short-duration anomalous "spike" or laboratory error could temporarily halt the dredging operations, the standard requires that the concentration be confirmed by an average of four samples collected the next day with 24-hour laboratory turnaround time.

Please comment on the reasonableness of the 500 ng/L Total PCBs threshold concentration developed for the Resuspension Standard.

Comment 10: In general, there is agreement on the reasonableness of the 500 ng/L standard.

Response 10: Comment acknowledged.

Comment 11: The concern and control levels for total PCBs should be based as the lower 95% confidence interval estimated around the 500 ng/L standard.

Response 11: This recommendation may be a valid approach for the implementation of the Resuspension Standard; however, not enough data are available to apply it for Phase 1, given that the true variability of water column concentrations during dredging is not yet known. Instead, USEPA developed a Total PCB concentration of 350 ng/L as an appropriate warning level (see Vol. 1, Section 2.1 and Vol. 2, Section 3.1.1 of the final Engineering Performance Standards). Support for the use of the 350 ng/L value (associated with the Control Level in the Standard), as well as the derivation of the lower 95 percent confidence interval, are provided.

To address this comment, USEPA has examined the variability of PCB concentrations in the water column under baseline (*i.e.*, pre-dredging) conditions, although it is likely that dredging-related variability will be greater than the baseline variability. The 350 ng/L Total PCBs value is supported by two statistical analyses of baseline water column variability and the analytical uncertainty in the baseline water column PCB measurements (see Vol. 2, Section 3.1.1.1 of the final Resuspension Standard) Thus, USEPA has determined that the 350 ng/L Total PCBs value is appropriate as an initial value to be applied in Phase 1.

During the deliberations meeting in January, the peer reviewers also raised the question of analytical precision as it pertains to water column measurements. As verbally indicated to the panel, the precision of the historical analyses is quite good. At the Schuylerville station, blind duplicate pairs analyzed for General Electric Company yielded a median RPD[2] of 8.1 percent and a mean RPD of 12.7 percent. Ninety percent of all pairs had an RPD less than 22 percent.

[2] RPD, or relative percent difference, is defined as $RPD = \frac{|Value_1 - Value_2|}{\frac{(Value_1 + Value_2)}{2}} * 100\%$

For a concentration of 350 ng/L Total PCBs, the historical mean RPD suggests a possible analytical range of uncertainty of 328 ng/L to 372 ng/L (actual value + RPD/2). On this basis, the analytical precision is not expected to be a concern in applying the 350 ng/L Total PCB value.

Charge Question 5: Monitoring Program

The 2002 ROD states (see, p. iii), "Beginning in phase 1 and continuing throughout the life of the project, USEPA will conduct an extensive monitoring program." Section 3.3: Monitoring Plan and Attachment G (and related tables and figures) describe the attendant monitoring program for the Resuspension Standard.

Please comment on whether the monitoring program reasonably can be expected to provide adequate data in Phase 1 that will allow USEPA to evaluate necessary adjustments to dredging operations in Phase 2 or to the Resuspension Standard. Also, please identify any necessary improvements to the monitoring program.

Comment 12: The panel recommends a special study during phase 1 to assess non-target area impacts.

Response 12: Both the draft Resuspension Standard and the draft Residuals Standard included elements acknowledging the potential for contamination of non-target areas. For example, Section 2.2.7 of the draft Resuspension Standard addressed PCB deposition immediately downstream of the dredge operations, and presented the results of the TSS-Chem model used to investigate the potential for non-target area impacts (see p. 37). Based on these modeling results, USEPA concluded that remedial operations at the Evaluation Level, or even at the former Concern Level, would not have an adverse impact on downstream non-target areas. However, the Standard acknowledged that silt barriers might be required to prevent the spread of contamination to areas downstream of the target areas. In light of this comment, USEPA has revised the Resuspension Standard to require a special study to determine the extent and degree of contamination in downstream non-target areas and to assess if the resuspension controls deployed are adequate. Vol. 1, Section 5.5 and Vol. 2, Section 4.4.5 of the final Engineering Performance Standards describe the requirements for the design and implementation of this special study.

Comment 13: The panel recommends consideration be given to reducing the number of monitoring stations if not needed for compliance determinations. This would especially apply to the near-field monitoring stations around each piece of equipment and the furthest downstream stations.

Response 13: The Resuspension Standard has been revised to define the conditions for which a reduced number of near-field monitoring stations is permissible to address safety concerns and closely spaced work areas (see Vol. 2, Section 4.2.5 of the final Engineering Performance Standards). In addition, evaluation of the data from the Phase 1 near-field suspended solids monitoring will likely facilitate a reduction in the number of locations that need to be monitored in the near-field in Phase 2 (see response to comment 5, above).

The standard requires that far-field stations be monitored throughout the Upper Hudson River and in the upper portion of the Lower Hudson (*i.e.,* from Fort Edward to Poughkeepsie). Monitoring at these stations, some of which are miles downstream from the area(s) being dredged, currently is required for compliance. Aspects of the remediation other than dredging, such as transportation of dredged sediment to the processing facility(ies), may have impacts in these downstream areas.

Comment 14: The panel recommends that data should be taken only to answer specific questions. The onus will be on the standard writer to make an explicit statement of what question is to be answered. This would include analyses for each location, data type, and frequency at each action level.

Response 14: Comment acknowledged. The monitoring program for the Resuspension Standard was developed in accordance with USEPA's quality assurance guidance. Data quality objectives for each element of the program are described in detail in Section 3.4 & Attachment G of Volume 2, Technical Basis and Implementation of the Resuspension Standard. Specifically, the need for monitoring at each station, with regard to the analytical parameters, matrix and frequency, is discussed and justified. USEPA's Decision Error Feasibility Trials Software (DEFT) was used to provide statistical support to establish a sample frequency that corresponds to an acceptably low probability of making an incorrect decision due to insufficient data. Section 3.4 & Attachment G (located in Vol. 2 in the final Engineering Performance Standards) have been clarified with respect to the objectives of the program and text has been added to summarize the results of the DEFT analysis.

Comment 15: The panel recommends consideration be given to using the "homologue method."

Response 15: The monitoring program is based on data quality objectives established using accepted principles embodied in USEPA's quality assurance guidance. Any method that meets all of the data quality objectives (*e.g.*, accuracy, sensitivity) may be considered. Of the currently available methods, only PCB congener analysis is able to achieve these objectives, due to the greater sensitivity of this method. The Resuspension Standard has been revised to specify that the analytical methods approved by USEPA must meet or exceed the specifications of the analytical methods used to generate the baseline water column concentration data, to ensure a consistent metric from baseline conditions (*i.e.*, pre-dredging) to dredging conditions to long term, post-dredging monitoring (see Vol. 2, Section 4.2.2 of the final Engineering Performance Standards).

Comment 16: The panel recommends that a special study of split phase PCBs be conducted in the near-field and that split phase sampling be dropped from the far-field.

Response 16: As stated in the responses to comments 1 and 5, above, USEPA is requiring a special study to determine whether the PCB release is primarily resuspension particle-based or whether it is primarily in the dissolved phase (see Vol. 1, Sections 5.1 & 5.2 and Vol. 2, Sections 4.4.1 & 4.4.2 of the final Engineering Performance Standards). The study allows elimination of split-phase sampling at the far-field monitoring stations.

Comment 17: USEPA should use temporal composite whole water samples for PCBs in the far-field.

Response 17: The Resuspension Standard includes an option for proposal and testing of an alternative monitoring program, which could conceivably include temporal composite whole water samples. If an alternative monitoring program is proposed by the project designers, a special study must be implemented during Phase 1 to test the alternative program's ability to meet the Resuspension Standard's DQOs (see Vol. 1, Section 5.4 and Vol. 2, Sections 3.4 & 4.4.4 of the final Engineering Performance Standards).

Comment 18: If the collected monitoring data in near-field and far-field are meeting or exceeding necessary levels for protection of human health and the environment, USEPA may, at its discretion, reduce the level of monitoring in the program.

Response 18: The Resuspension Standard has been revised to state that monitoring requirements may be reduced at USEPA's discretion after a higher level of monitoring has consistently demonstrated compliance (see Vol. 1, Section 6.2.1 of the final Engineering Performance Standards).

Comment 19: USEPA should adopt a goal to develop and implement a potential Phase 2 monitoring program before the end of Phase 1.

Response 19: The Resuspension Standard has been revised to state that USEPA will consider implementation of a Phase 2 monitoring program prior to the end of Phase 1, if the data support this modification (see Vol. 1, Section 6.2.1 of the final Engineering Performance Standards).

Comment 20: The New York State Department of Environmental Conservation (NYSDEC) needs to provide documentation regarding the 401 Water Quality Certification requirements and in particular they need to address dissolved oxygen (DO), pH, and how they view non-target contaminants of concern (*e.g.*, metals). The state also needs to address the PCB assimilation capacity issue. Once that is written, the standard needs to consider associated impacts.

Response 20: Comment acknowledged. The New York State Department of Environmental Conservation (NYSDEC) is currently developing the substantive requirements for the 401 Water Quality Certification. USEPA is coordinating with NYSDEC regarding these requirements and, once they are developed, will evaluate them for any impacts on the final Resuspension Standard.

Comment 21: Cost-benefit and implementability analysis of the monitoring program needs to be documented.

Response 21: USEPA provided a cost estimate for the monitoring program in its October 10, 2003 response to public comments from General Electric Company. This cost estimate has been updated to reflect changes in the monitoring program and has been incorporated into the final Resuspension Standard (see Vol. 2, Attachment H). The implementability of the monitoring program has been assessed, including a review of sample turn-around times (see Attachment H of the final Resuspension Standard). A formal cost-benefit analysis of the program has not been conducted because it is difficult, if not impossible, to quantify all the benefits associated with the monitoring, which include protection of human health.

Comment 22: There is a suggestion that a relationship between turbidity, suspended solids, and PCBs is not needed to control solids losses.

Response 22: In light of this comment and others, USEPA is separating out several "special studies" (see response to comment 1). Two special studies will address development of a semi-quantitative relationship between TSS and a surrogate real-time measurement (see response to comment 5 above, Vol. 1, Sections 5.2 & 5.3, and Vol. 2, Sections 4.4.2 & 4.4.3 of the final Engineering Performance Standards). One special study will be conducted to develop a bench scale correlation between TSS and a surrogate for use during the remediation. For the near-field, turbidity is expected to be a suitable surrogate. For the far-field, laser particle analysis also will be assessed because the turbidity signal in the far-field may be difficult to distinguish from baseline conditions. The second special study will be conducted to implement and maintain a full-scale semi-quantitative relationship between TSS and a surrogate.

Main Points on the Residuals Standard

Charge Question 6: Framework.

USEPA's 2002 ROD calls for removal of all PCB-contaminated sediments (i.e., to non-detection levels) in areas targeted for dredging, with an anticipated residual of approximately 1 mg/kg Tri+ PCBs prior to backfilling (Tri+ PCBs are the subset of PCBs with 3 or more chlorine atoms). The Residuals Standard builds on the requirements in USEPA's 2002 ROD as well as case studies and regulatory guidance (see, Section 2.1: Background and Approach). It requires comparison of PCB concentrations in post-dredging sediment samples within a given area (i.e., ~ 5-acre certification unit) to statistically-based PCB concentrations (i.e., action levels), which then guide appropriate actions (see, for example, Figure 1-1). The Residuals Standard was developed with this framework to accommodate the project need for both protection and production, in that post-dredging sampling can proceed directly upon USEPA verification that the design cutlines have been attained and the options for appropriate next steps are known and, to the extent possible, pre-approved during design.

Please comment on whether this framework provides a reasonable approach for developing the Residuals Standard.

Comment 23: The Peer-Review Panel is in general agreement that the framework is reasonable and based on sound scientific principles, as stated.

Response 23: Comment acknowledged.

Comment 24: The goals of the Residuals Standard need to be articulated better. The standards focus solely on confirmation of removal of all PCBs with an anticipated post-dredging (pre-backfill) residual PCB concentrations of 1.0 mg/kg Tri+PCBs. The Residual Standard also appears to have an unstated goal that after backfill, an expected surface sediment concentration of ≤0.25 mg/kg (assuming 1-ft backfill) will be achieved. That level is necessary to support levels of risk reduction to human health and the environment that were used in the ROD, as predicted by the HUDTOX model.

The specific objectives of the standard need to be articulated better at the beginning of the performance standards, to include the following goals:

- Inventory removal (standards for inventory removal are not included; rather, the standards assume inventory removal is achieved)
- Post-dredging pre-backfill residual concentrations [tri+ PCBs] = 1 mg/kg
- Post-backfill surface sediment target concentration based on risk reduction of 0.25 mg/kg.

- The standards need to address how these goals will be met; that is, how will the monitoring program be used to meet these goals.

Response 24: The final Residuals Standard identifies and describes its two objectives as follows: removal of all PCBs in targeted areas, and a residual of approximately 1 mg/kg Tri+ PCBs in dredged areas. The final Engineering Performance Standards also present fundamental principles which guided the development of the standard (see Vol. 1, Sections 1.0 and 1.3). In addition, Attachment B has been added to the final Residuals Standard (see Vol. 3), which contains the data quality objectives for the monitoring program. These data quality objectives state how the monitoring will be used to support the two overall objectives of the Residuals Standard.

The Residuals Standard will also clearly identify the contingency actions that may be implemented for non-compliant residuals, including the option to place backfill over residuals with Tri+ PCB concentrations between 1 and 3 mg/kg, with the requirement that the backfill surface be tested and confirmed to be less than or equal to 0.25 mg/kg Tri+ PCBs.

Comment 25: The proposed framework can be used to meet the objectives (as the panel understands them) of the standard. However, the panel believes that the framework is complex and directly impacts the potential success of the productivity standard. As crafted, the standard requires dredging, followed by up to two additional dredge passes, followed by either a mandatory 1- ft. backfill or cap. The alternate framework described below may provide greater potential for success in the field. The cost of the potentially increased amount of dredging has to be balanced with the possible reduction in redredging and testing.

The alternative framework is as follows:

- The design needs to specify the dredge prisms such that the inventory removes Tri+PCBs in excess of 1.0 mg/kg; bottom elevations should be based on the lower confidence of the mean of the 1.0 mg/kg Tri+PCB target concentration; re-stated, the dredge prisms should be designed with sufficient certainty that no more than 5% of the target areas would be expected to exceed the 1.0 mg/kg tri+ PCB goal.

- Confirmation of inventory removal (e.g., bathymetry or similar measurements) should be incorporated into the standard.

- No re-dredging would be required unless the target elevation is not achieved.

- Once dredging is complete, and design elevations verified, the contractor will have two alternatives:
  - Backfill without further testing
  - Avoid backfilling by verifying that dredging achieved an average surface sediment concentration ≤0.25 mg/kg Tri+PCB; this will be done through confirmatory sampling similar to the sampling requirements stipulated in draft Performance Standard.
- During Phase 1, pre-backfill and/or post-backfill investigative sampling may be required to validate this approach.

Response 25: In outlining the alternative framework, the peer reviewers touched upon many of the issues that were discussed in detail during development of the Residuals Standard. USEPA has considered the alternative framework and, for the reasons discussed below, has decided not to adopt it.

- The alternative framework does not require post-dredging sampling of dredging residuals, and thus assumes that the pre-design sediment sampling results will be sufficiently representative and accurate to establish design dredge lines that will remove all the PCBs. Without post-dredging sampling of the dredging residuals in Phase 1, USEPA cannot verify that the dredging operations have achieved the ROD requirement for removal of all PCB-contaminated sediments within areas targeted for dredging. Similarly, without post-dredging sampling of the residuals, USEPA cannot verify that the dredging operations have achieved the ROD's requirement for an approximately 1 mg/kg Tri+ PCBs residual concentration. The post-dredging residuals sampling is necessary because the recovery of the river depends both on PCB inventory removal and on minimizing the residual levels of PCBs after dredging. In recognition of this concern, the alternative framework states that pre-backfill investigative sampling may be required to validate the alternative framework. Adding some pre-backfill investigative sampling would bring the alternative framework conceptually closer to the Residuals Standard, but is not sufficient to demonstrate compliance with the ROD.
- The alternative framework is less cost-effective than USEPA's Residuals Standard.

Designing the dredge prisms to provide sufficient certainty that no more than 5% of the target areas would exceed a 1 mg/kg Tri+ PCB residual, as suggested in the alternative framework, would require significantly more pre-design sampling than General Electric Company has conducted. It also would require very conservative assumptions regarding sediment removal (*e.g.*, a substantial overcut). For the Hudson, the costs for this additional pre-design sampling and greater sediment processing, transportation and disposal would be much greater than the cost of post-dredging sampling and potential partial redredging. Under the Residuals Standard, redredging may not even be required, depending on the results of the post-dredging sampling in a particular certification unit, creating an incentive for quality dredging that does not exist under the alternative framework. The peer reviewers recognized the cost-effectiveness issue in comment 25, above, which states: "The cost of the potentially increased amount of dredging has to be balanced with the possible reduction in redredging and testing."

- The alternative framework would require a rigid approach to pre-design sampling and dredging cut-line design. In contrast, the Residuals Standard does not prescribe a specific design approach for the dredging remediation, and therefore provides latitude to the designers to creatively meet the project objectives. For example, design of cut-lines can be performed using geostatistical methods (e.g., semivariogram analysis) or other analytical techniques (use of the binomial distribution to estimate the necessary overcut to remove contaminated sediment inventory).
- The alternative framework recommends testing of the residuals surface concentration to alleviate the need to place backfill in areas with Tri+ PCB residuals concentrations less than 0.25 mg/kg. This is not appropriate because design requirements for placement of backfill are not solely associated with residuals concentration, and should not be confused with the Residuals Standard's contingency action allowing placement of backfill over slightly non-compliant residuals with required subsequent testing of the backfill surface. Design issues for backfill placement are summarized in Section 1.2 of Volume 3 of the final Engineering Performance Standards.

Similar to the alternative framework, the Residuals Standard requires confirmation that the design cut lines have been attained/achieved prior to sampling (see Section 4.2 of Volume 3). The Residuals Standard assumes that bathymetry or another method would be employed for confirmation.

Charge Question 7: Statistical Analyses.

The supporting analyses for the Residuals Standard, in particular the statistical analyses of site-specific sediment data collected in the Upper Hudson and the sediment data from case studies of environmental dredging projects, are presented in Section 2.2 (and associated tables and figures) and in Attachment A of the Residuals Standard.

Please comment on whether the statistical analyses are technically adequate and properly documented.

Comment 26: Within the context of the draft framework, the statistical analysis was technically adequate and properly documented.

Response 26: Comment acknowledged.

Charge Question 8: Post-Dredging Confirmatory Sampling Program.

Section 2.2.9 and Section 3.0 of the Residuals Standard present an evaluation of available sampling techniques and describe the procedures for establishing the post-dredging confirmatory sampling grid, collecting and managing the samples, and evaluating the sample data and required actions. In certain circumstances identified in the Residual Standard, a certification unit can be evaluated by considering the sediment data in three previously dredged certification units within 2 miles (i.e., a 20-acre evaluation).

Please comment on the adequacy of these aspects of the Residuals Standard, in particular the concept of a 20-acre evaluation area for Phase 1.

Comment 27:

1. The 20-acre unit is intended to provide flexibility to the contractor to achieve the 1.0 mg/kg treatment goal. If the alternative framework is employed, the concept of the 20-acre unit may not be relevant. Otherwise, within the existing framework the 20-acre unit concept is reasonable. The concept should be re-evaluated for Phase 2 based on the final surface area concentrations measure during Phase 1.

2. Some Peer-Review Panel members felt the 40 samples per certification unit could be composited. Others felt that compositing should not be permitted during Phase 1, but that it could be considered during Phase 2. If compositing is employed, the restrictions should be included in the sampling program:

   - Composited samples should be analyzed in duplicate or triplicate

- Aliquots of each of the 40 samples should be saved for individual analyses, in the event that the sample does not meet the 1.0 mg/kg goal.

Response 27: For the reasons discussed in the response to comment 25, USEPA has decided not to adopt the peer reviewers' alternative framework for the Residuals Standard. The Agency acknowledges the peer reviewers' comment that within the existing framework the 20-acre joint evaluation area is reasonable. In addition, USEPA agrees that the joint evaluation concept should be re-evaluated for Phase 2; the Residuals Standard described a possible 40-acre joint evaluation area for Phase 2, if supported by the Phase 1 data, and this concept has been retained in the final Residuals Standard (see Vol. 1, Section 6.2.2).

With respect to the issue of composite sampling, USEPA agrees with the recommendation of some peer reviewers against compositing in Phase 1. Composite sampling is not permitted during Phase 1 because the distribution and variability of the residuals data must be tested to verify the assumptions that are the basis of the standard and the thresholds that were developed from the case studies of other sites.

Section 4.0 of the draft Residuals Standard stated that USEPA will evaluate the Phase 1 data with respect to the number of sampling locations per certification unit and will perform statistical analysis to test assumptions regarding required sampling frequency. This text has been retained for the final Residuals Standard (see Vol. 1, Section 6.2.2), and the feasibility of a composite sampling program for residuals may be examined following Phase 1. USEPA notes that if composite sampling were to be implemented, there would be no population from which to evaluate compliance with the PL and median criteria and where composite samples failed to comply with a relevant criterion (the UCL), it is likely that analysis of individual archived samples would have to be conducted, potentially causing delays. Therefore, compositing would require substantial changes to, if not an entire restructuring of, the Residuals Standards for implementation in Phase 2. Depending on the observed distribution of the residual contaminant concentrations in the Upper Hudson River and potential individual sample result PL exceedances encountered during Phase 1, it may not be possible to eliminate dependence on discrete sampling and the PL criteria for implementation of the standard.

Charge Question 9: Re-dredging and Engineering Contingencies.

Consistent with the 2002 ROD, the Residuals Standard is clear in describing USEPA's preference for dredging over capping as a means of sequestering PCB inventory (mass). The standard also addresses the expectation that some targeted areas of the Upper Hudson river bottom may be difficult to dredge effectively, such as rocky areas. For these special circumstances, the standard addresses re-dredging and the number of additional re-dredging attempts, how the extent of the non-compliant area is to be determined, and the use of engineering contingencies to address recalcitrant residuals (e.g., alternative dredge, cap). Relevant sections of the document include Section 2.3.5: Determining the Number of Re-Dredging Attempts, Section 2.3.6: Engineering Contingencies for the Residuals Standard, Section 3.5.1: Re-dredging and Required Number of Re-dredging Attempts, Section 3.5.2: Determining the Extent of the Non-Compliant Area, and Section 3.6: Engineering Contingencies.

Please comment on the reasonableness of the Residuals Standard with respect to re-dredging and engineering contingencies.

Comment 28:
The document did not adequately discuss cap and backfill material placement and performance metrics.

Response 28: Section 3.6 of the draft Residuals Standard addressed backfill and capping issues. New text in Section 1.2 of the final Residuals Standard (Vol. 3) has been included to more fully describe the design criteria for backfill and to clarify that specifications for backfill will be developed as part of the remedial design being performed by General Electric Company, consistent with the August 2003 Remedial Design Work Plan. Guidance for capping design was included in Section 3.6 of the draft Residuals Standard and is retained in the final Residuals Standard in the analogous Section 4.6.

Comment 29: The SPI requirement should be revisited or removed.

Response 29: The requirement for sediment profile imagery (SPI) at 25% of the residual sampling locations in Phase 1 has been replaced with a requirement that a special study be conducted to characterize the sediment type, stratigraphy, and thickness of the disturbed/resettled residuals layer at a representative number of sampling locations (selected to allow testing in a range of sediment types and following varied dredging operations, if multiple dredge types are used). Acceptable methods for the special study include the collection and evaluation of core samples and SPI technology, as appropriate, and methodology is to be finalized during design. The findings of the special study will be used to evaluate the sample collection and management methods required for Phase 2. The special study requirements are provided in Vol. 1, Section 5.6 and Vol. 3, Attachment B of the final Residuals Standard.

Comment 30: There is general consensus to limit the number of re-dredging attempts. Currently, the Residuals Standards requires no more than two re-dredging attempts. Under the alternative framework, re-dredging requirements will be based on achieving design elevations. However, if the alternative framework is not implemented, the existing framework should evaluate the efficacy of multiple dredging attempts during Phase 1. This evaluation should consider a) whether re-dredging results in lower surface sediment concentrations and achieves the surface sediment concentration goals, and b) whether re-dredging negatively impacts resuspension. If re-dredging negatively impacts resuspension, the impacts on resuspension should be weighted against the potential benefits of re-dredging. The Phase 2 Residuals Standards should reflect the results of this evaluation in the interest of further reducing re-dredging requirements.

Response 30: USEPA acknowledges the comment supporting a limit on the number of re-dredging attempts. Vol. 1, Section 6.2.2 retains the concept of using Phase 1 data to evaluate the appropriateness of any modifications to the re-dredging requirements for Phase 2 and has been clarified in light of this comment. For the reasons discussed in the response to comment 25, USEPA has decided not to adopt the peer reviewers' alternative framework for the Residuals Standard.

Comment 31: The Performance Standard needs to more clearly articulate where backfill is required. As the panel understands it, backfilling is required in all dredged areas except within the navigation channel, if specific habitat (deep water) is desired, or if a cap is deemed necessary.

Response 31: Vol. 3, Section 1.2 of the final Residuals Standard summarizes the requirements for the placement of backfill.

Comment 32: The panel believes that the design criteria for sediment caps and backfill need to be better documented.

Response 32: Please refer to the response to comment 28. Sections 1.2 and 4.6 of the final Residuals Standard (Volume 3) state that specifications for backfilling and capping will be developed as part of the remedial design being performed by General Electric Company,

<u>consistent with the August 2003 Remedial Design Work Plan.</u>

Main Points on the Productivity Standard

Charge Question 10: Framework.
The requirements of the 2002 ROD inform the overall parameters of the Productivity Standard (e.g., dredging of an estimated 2.65 million cubic yards in 6 years, with the first dredging season [Phase 1] at a reduced rate of dredging) (see, Section 2.1: Background and Approach and Section 2.3: Rationale for the Development of the Performance Standard). Within this context, the Productivity Standard requires compliance with minimum cumulative volumes of sediment for each dredging season and targets larger cumulative volumes for the first five dredging seasons. In requiring <u>cumulative</u> annual volumes, the standard accounts for the expectation that some areas will be faster to dredge than others, and thus provides an opportunity to carry over the benefit of this faster dredging from one year to the next as a "cushion" against when dredging more difficult areas. In setting <u>targeted</u> cumulative annual volumes, the standard provides for the dredging to be designed to attain a somewhat faster rate of dredging, so that a reduced volume remains in the sixth (final) dredging season and additional time is available to address any unexpected difficulties. The Productivity Standard was developed with this framework to ensure that the dredging design and implementation meet the schedule called for in the ROD.

Please comment on whether this framework provides a reasonable approach for developing the Productivity Standard.

Comment 33: The concept of cumulative volumes and monthly targets are considered to be a reasonable approach.

<u>**Response 33:** Comment acknowledged.</u>

Comment 34: During Phase 1 volume is less important than the information gained, but we recommend that the target in Phase 1 be at least 150,000 cubic yards.

<u>Response 34: In light of the peer reviewers' discussions surrounding this comment, USEPA has reduced the size of the required volume for Phase 1 from 240,000 to 200,000 cubic yards. As a result, the required volume for Phase 2 has increased by 40,000 cubic yards.</u>

Comment 35: Consider establishing a lower target production volume for year 2 to take full utilization of the new data gathered during Phase 1.

<u>**Response 35:** Rather than reducing the required volume in year 2, which could unnecessarily slow down the project, USEPA will consider implementing elements of the Phase 2 standards in Phase 1, as appropriate, to take full advantage of the Phase 1 data (see Vol. 1, Section 6.3.4).</u>

Comment 36: Phase 1 dredge sites should be chosen carefully to provide specific data on dredge

and disposal production under different conditions anticipated during Phase 2 dredging.

Response 36: Comment acknowledged. Section 4.1.2 of the final Productivity Standard retains the statement in the draft standard: "It is expected that Phase 1 dredging will be performed in areas exhibiting a range of dredging conditions which might be expected during the full scale project..."

Charge Question 11: Example Production Schedule

As part of the development of the Productivity Standard, an Example Production Schedule was developed based on site-specific information and case studies of other environmental dredging projects to demonstrate that the Productivity Standard can be met. Relevant sections of the document include Section 2.2: Supporting Analyses, Attachment 1: Productivity Schedule, Attachment 2: Productivity Schedule Backup, and Attachment 3: Evaluation of Applicable Dredge Equipment for the Upper Hudson River.

Please comment on the reasonableness of the Example Production Schedule, including the reasonableness of the underlying assumptions for equipment selection and efficacy, as well as the time necessary to deploy, use, and move equipment.

The panel recommends that USEPA should strengthen the documentation on the following underlying assumptions that need to go into the Example Production Schedule:

Comment 37: Present better documentation of the utilization of the equipment to explain the dredging rates, capping rates, sheet piling installation rates, and other required work items.

Response 37: Table 1-5: Example Production Schedule Production Rates, in Vol. 4, Attachment E of the final Productivity Standard has been revised to include the sources or basis for the assumed production rates.

Comment 38: Present a complete description of the river transportation cycle, including barge capacity, locking time, interference from river traffic, and mooring facilities at transfer facility.

Response 38: Vol. 4, Attachment A has been added to the final Productivity Standard to provide this analysis.

Comment 39: Present a complete description of the transfer facility, including the layout and the process.

Response 39: Vol. 4, Attachment B has been added to the final Productivity Standard to provide this analysis.

Comment 40: Present a complete geotechnical description of material to be dredged, including soil borings, SPT blowcounts, water contents, grain size distribution, plasticity.

Response 40: A summary of the latest data, compiled from the 2002 and 2003 pre-design sediment sampling program conducted by GE, has been added to Vol. 4, Section 2.2.2, In-River Factors, in the final Productivity Standard.

Comment 41: Complete a sensitivity analysis of the re-dredging effort on overall schedule.

Response 41: In November 2003, USEPA provided the peer reviewers with an analysis of the time required to re-dredge an area. This information has been added to Vol. 4, Section 1.1.5 of Attachment D to the final Productivity Standard. In addition, the Example Production Schedule has been run with different assumptions regarding the percentage of the project that will require re-dredging. The results are presented in Vol. 4, Section 1.1.6 of Attachment D to the final Productivity Standard.

Comment 42: Present typical information on river velocities (feet per second) in addition to flow rates (cubic feet per second) by month and location.

Response 42: Velocities in the project area typically range from around 0.1 foot per second to about 1.5 feet per second at normal summertime flow rates, depending upon location and the rate at which water is being released from Great Sacandaga Lake. The detailed information requested in this comment is part of the design of the project being developed by General Electric Company.

Comment 43: Review the impact the Quality of Life Standards for noise and lights and their effect on production rates. For example, a clamshell bucket offloading backfill or cap material from a deck scow could produce noise levels that exceed the Quality of Life Standard.

Response 43: USEPA released the draft Quality of Life Performance Standards for public comment from December 19, 2003 to February 17, 2004. The Agency will respond to all relevant comments and issue the final Quality of Life Standards. USEPA's Administrative Order on Consent for remedial design requires that General Electric Company's remedial design be consistent with, and fully take account of, the performance standards.

Comment 44: Develop an operations plan that describes and shows the working relationships between the different equipment. Specifically, show relative equipment locations especially for the multiple dredging and backfilling events.

Response 44: The information requested in this comment is part of the design of the project being developed by General Electric Company.

Comment 45: Describe the assumed impacts of the Water Quality Certification on production rates.

Response 45: USEPA is coordinating with NYSDEC regarding NYSDEC's development of the substantive requirements of the 401 water quality certification (see response to comment 20). The Example Productivity Schedule assumed that the discharge limits would be similar to those set for other dredging projects in New York State and would specify a discharge limit of 64 ppt for tPCBs. This standard has been consistently met using granular activated carbon as a final step in the treatment of dredge return water (See Vol. 4, Section 2.2.5).

Comment 46: Conduct a critical path analysis.

Response 46: The information requested in this comment is part of the design of the project being developed by General Electric Company.

Charge Question 12: Action Levels

The Productivity Standard includes two tiered action levels (Concern and Control) prior to any determination of non-compliance with the standard, as well as their respective required actions and monitoring and recordkeeping requirements. Relevant sections of the document are Section 1.1: Implementation and Section 3.3: Monitoring, Record Keeping and Reporting Requirements.

Please comment on the appropriateness of the action levels and the required actions, as well as the reasonableness of the monitoring and record keeping requirements.

Comment 47: For Phase 2, the actual target cumulative volume must be based on an orderly progression of the dredging from upstream to downstream. This may entail some intermediate years having cumulative volumes that reflect either significantly slower or significantly faster production for the year than the average. The actual cumulative volume should be confirmed in a complete dredging schedule that shows the entire quantity of remedial activities completed in accordance with the ROD.

Specific information that should be collected, in addition to that presented in the report, includes:

- Number of hours of actual dredging time to determine and monitor efficiency and net and gross production rates.
- Monitoring of offloading rates.
- Monitoring of capping and backfilling production rates.
- Monitoring of shoreline work.
- Noting any other delays associated with river flow conditions, weather, traffic, Quality of Life Standards, equipment problems, sampling work, or other activities. It is important to be able to see if there are trends with delays.

<u>**Response 47:** Vol. 1, Section 6.2.3, Guidelines for Possible Revision of the Standards for Phase 2: Productivity and Vol. 4, Section 4.2, Monitoring and Reporting Requirements, of the final Productivity Standard have been clarified to state that the U.S. Army Corps of Engineers Daily Report of Operations for the appropriate dredge type will be used to collect the information.</u>

Main Points on Issues Relevant to All Three Standards

Charge Questions 13: Interactions Among the Standards

Because the Engineering Performance Standards for Resuspension, Residuals and Productivity will be applied in conjunction with one another, the standards must be considered as a whole as well as individually. In developing the standards, their points of interaction were balanced to allow flexibility during design and implementation, while ensuring that human health and the environment are adequately protected. Thus, the standards contain self-correcting features (e.g., the requirements for additional re-dredging attempts in the Residuals Standard must consider the requirements for dredging production in the Productivity Standard). The interactions among the standards are discussed in the Executive Summary, Introduction, and Section 3.2 of the Productivity Standard.

Please comment on whether the main interactions among the standards are properly documented and taken into account.

There were no peer review comments on this issue.

Charge Question 14: Plans for Refining the Standards

Section 4.0 presents the plans for refinement of each standard.

Please comment on whether there are any additional aspects to effectively accomplish the refinement that USEPA should consider in evaluating the Phase 1 data.

Comment 48: The panel recommends there be a summary capturing interactions between standards.

Response 48: Vol. 1, Section 3.0 has been added to the final Engineering Performance Standards, which provides a summary of the interactions among the standards.

Comment 49: There needs to be a balance between the standards and a decision process that allows the parties to achieve that balance.

Response 49: The Engineering Performance Standards specify the final standards for Phase 1 and how they are to be implemented. As noted in the response to comment 42, USEPA's Administrative Order on Consent for remedial design requires that General Electric Company's remedial design be consistent with, and fully take account of, the performance standards. An appropriate decision-making process for resolving unforeseen difficulties encountered in the field during remedial action is beyond the scope of the Engineering Performance Standards.

Comment 50: Risk reduction at the end of the project is the goal of the balancing process.

Response 50: Compliance with the Engineering Performance Standards will reduce both the short-term risks during dredging as well as the long-term risks after the dredging is completed.

Comment 51: Data gathering to refine all standards should be stressed in Phase 1 and an attempt should be made to revise the approach by the end of the first year.

Response 51: In light of this comment and as noted in the response to comment 35, Vol. 1, Section 6.3.4 has been added to the final Engineering Performance Standards and states that USEPA will consider implementing elements of the Phase 2 standards in Phase 1, as appropriate, to take full advantage of the Phase 1 data.

Comment 52: The peer reviewers recommend that USEPA develop a process to evaluate data as it is generated and modify the implementation process in Phase 1. The proposed Phase 1 peer reviewers should be involved during Phase 1.

Response 52: Vol. 1, Section 6.3 has been added to describe a transition plan between Phase 1 and Phase 2, including ways to facilitate the peer review of the Phase 1 evaluation report.

Charge Question 15: Other Issues

Please provide any other comments, concerns or suggestions, involving both strengths and weaknesses, with respect to the October 2003 Draft Engineering Performance Standards – Peer Review Copy that may not be fully covered by the above charge questions.

Comment 53: Cost-benefit and implementability analysis of the monitoring program needs to be documented.

Response 53: As noted in the response to comment 21, USEPA prepared an updated cost estimate for the Resuspension monitoring program, but did not conduct a formal cost-benefit analysis because it is difficult, if not impossible, to quantify all the benefits associated with the monitoring, which include protection of human health. The updated cost estimate is presented in Attachment H of the final Resuspension Standard (Vol. 2).

Comment 54: Individual members recommended that design criteria be included for the final dredge surface such that sediment entrapment and re-contamination is minimized.

Response 54: The information requested in this comment is part of the design of the project being developed by General Electric Company.

Comment 55: Some members recommend performance criteria for re-contamination that acknowledge that non-target areas will equilibrate with areas of remediation.

Response 55: As noted in the response to comment 12, the final Resuspension Standard requires a special study to determine the extent and degree of contamination in downstream non-target areas and to assess if the resuspension controls are adequate. Vol. 1, Section 5.5 and Vol. 2, Section 4.4.5 of the final Engineering Performance Standards describe the requirements for the design and implementation of this special study. Re-equilibration between dredged and non-target areas is not likely to impact residuals sampling, which is required within 7 days after the completion of dredging. Previously conducted USEPA modeling accounted for the *in-situ* concentrations of PCB contamination in non-target areas, therefore the continued presence of non-target area PCB mass in the Hudson River is not expected to adversely impact recovery of fish following the remediation.

Comment 56: Some members suggest that the actions as defined in Tables 1-1 and 1-2 (of the Resuspension Standard volume) should be more directly related to controlling resuspension.

Response 56: Engineering responses to control resuspension are associated with the standard's action levels. Engineering solutions are recommended at the Evaluation Level and required at the Control Level and threshold of the standard. As noted in Volume 1, Section 6.0, additional requirements for resuspension control based on suspended solids exceedances may be added to the standard for Phase 2.

Comment 57: The standards should include a discussion of how the analytical methods and data management are to be applied and communicated. Clear guidelines on data interpretation need to be developed.

Response 57: Guidance for interpretation of the data to be collected under the performance standard monitoring programs is provided in Section 4.0 of each Technical Basis and Implementation volume (e.g., instructions on conventional rounding of results, etc.). As noted in the response to comment 14, the monitoring program for the Resuspension Standard was developed in accordance with USEPA's quality assurance guidance. Data quality objectives for each element of the monitoring program for the Resuspension Standard are described in detail in Vol. 2, Attachment G. Data quality objectives for each element of the monitoring program for the Residuals Standard are described in detail in Vol. 3, Attachment B. Minimum record keeping requirements are described in Vol. 1, Section 2.1.5 for the Resuspension Standard, Section 2.2.4 for the Residuals Standard, and Section 2.3.2.1 for the Productivity Standard. Detailed procedures for interpretation of the monitoring data are provided in Vol. 2, Section 4.2 and Vol. 3, Section 4.5 of the final Engineering Performance Standards.

Comment 58: A special study should be conducted during Phase 1 to assess the release of other contaminants (e.g., metals) during dredging.

Response 58: A study to evaluate metals releases during dredging is required as part of the treatability study work under General Electric Company's design.

Comment 59: Some panel members recommended that during Phase 1, these be considered goals or alternatively draft standards until reformulation for Phase 2.

Response 59: The ROD requires that the performance standards be enforceable, promote accountability and ensure that the cleanup meets the ROD's human health and environmental protection objectives.

Attachment A
Summary of Major Changes to the Engineering Performance Standards following Peer Review

In response to the peer reviewers' comments from the January 27-29, 2004 meeting, the following major changes to the Engineering Performance Standards have been made since the October 2003 Peer Review Copy.

Resuspension Standard

- The action levels were simplified by blending the Concern and Control Levels.
- Certain aspects of the monitoring program have been designated as special studies as follows:
  1. Near-field PCBs Mechanism of Release (resuspension particle-based or dissolved phase). This study allows elimination of split-phase sampling at the far field monitoring stations.
  2. Development of a Semi-Quantitative Relationship between TSS and a Surrogate Real-Time Measurement (Bench Scale) – to develop a bench-scale correlation between TSS and a surrogate for use during the remediation. For the near field, turbidity is expected to be a suitable surrogate. For the far-field, a laser particle method will also be assessed since the turbidity signal there may be difficult to distinguish from baseline conditions.
  3. Development of a Semi-Quantitative Relationship between TSS and a Surrogate Real-Time Measurement (Full Scale) – to implement and maintain a full-scale semi-quantitative relationship between TSS and a surrogate. Implementation of real-time monitoring will be required only at the near-field stations and at the nearest downstream far-field station. TSS samples will be collected periodically (one per day at each station) and used to confirm that the surrogate and the bench scale-derived relationship predicts, with a 95 percent level of confidence, that the actual TSS concentrations are below the Evaluation Level criteria for TSS.
  4. Non-Target PCBs - to determine the extent and degree of contamination in downstream non-target areas and assess if the resuspension controls are adequate.
  5. Phase 2 Monitoring Program – optional special study to determine if the proposed alternative monitoring program is implementable and satisfies the data quality objectives of the standard.
- To address analytical turn-around time issues, two TSS methods have been specified. ASTM Method 3977-97, which has a 12-hour turn-around time, has been retained. This method will be used for confirmation when a surrogate measurement is available to predict TSS concentrations and for routine monitoring at the far-field stations at which real-time TSS monitoring is not required. A modified TSS method with a 3-hour turn-around time has also been specified. This modified method can be used at the near-field and nearest downstream far-field stations whenever the surrogate measurement cannot be used in lieu of grab sampling. Co-located samples will be collected and tested to confirm the modified method.
- To address the potential use of automatic samplers, an alternative set of resuspension criteria has been added. These criteria were developed using USEPA's Decision Error Feasibility Trials (DEFT) software.
- Text has been added to identify the importance of the 650 kg Total PCB load loss limit over the entire remediation and state that compliance with this limit is indirectly measured through evaluation of the other load-based criteria (600 g/day Total PCBs and 65 kg /season Total PCB).

Attachment A
Summary of Major Changes to the Engineering Performance Standards following Peer Review

- Text has been added to discuss why best management practices (BMPs) were not selected as the basis of the standard and to identify the one criterion that is related to BMPs (*i.e.*, 300 g/day limit on Total PCB, the best estimate of releases from the dredging operations).
- Text has been added to better define the basis for selection of the 350 ng/L Total PCB resuspension criterion.
- Text has been added to define the conditions where a reduced number of near-field monitoring stations is permissible (safety concerns and closely spaced work areas).
- Text has been added to specify that the analytical methods chosen for the monitoring program must meet or exceed the specifications of the methods used to develop the baseline water column concentration data.
- Text has been added to state that the Phase 2 monitoring program requirements may be reduced at USEPA's discretion once a higher level of monitoring has consistently demonstrated compliance with the standard prior to the end of Phase 1.
- Text has been added to state that implementation of a Phase 2 monitoring program will be considered prior to the end of Phase 1, if the data support this modification.
- An attachment was prepared that provides the estimated costs for the Phase 1 sampling program.

Residuals Standard

- Text was added to state the intended function of backfill, to clarify where backfill is likely to be placed in the River following dredging, and to clarify that the backfill specifications will be developed as part of the engineering design.
- The requirement for sediment profile imagery (SPI) at 25% of the residual sampling locations in Phase 1 has been replaced with a requirement that a special study be conducted to characterize the sediment type, stratigraphy, and thickness of the disturbed/resettled residuals at a representative number of sampling locations (selected to allow testing in a range of sediment types and following varied dredging operations, if multiple dredge types are used). Acceptable methods for the special study include the collection and evaluation of core samples and SPI technology, as appropriate, and are to be finalized during design. The findings of the special study will be used to evaluate the sample collection and management methods required for Phase 2. The special study requirements are provided in a new attachment to the document.
- An attachment was prepared that identifies the specific data quality objectives associated with each sampling effort required by the Residuals Standard.
- An attachment was prepared that provides the estimated costs for the Phase 1 sampling program.

Productivity Standard

- The required volume for Phase 1 has been reduced from 240,000 to 200,000 CY. As a result, the required volume for Phase 2 has increased by 40,000 CY.

Attachment A
Summary of Major Changes to the Engineering Performance Standards following Peer Review

- Text was added to describe in more detail what dredged material counts as "credit" toward the productivity standard. Essentially, material to be removed as specified in the designed dredge prisms will count (*i.e.*, targeted volume including any overcut, side slopes, and over-dredging allowance; navigational dredging; or restoration). Examples of material that might be dredged that will not count toward meeting productivity include additional dredging for missed inventory, redredging for residuals, additional dredging for cap/backfill placement, dredging of contaminated non-target areas, and dredging of backfill demonstrated by sampling under the contingency procedures to have been contaminated during placement.
- Table A-5: Example Production Schedule Production Rates has been revised to document the source/technical basis for the assumed production rates.
- Two attachments were added to further demonstrate that the productivity standard is achievable. One attachment presents a complete description of the river transportation cycle, including barge capacity, locking time, and interference from river traffic; the second attachment presents a conceptual design for an on-shore processing facility for mechanically dredged sediments.
- Text was added to provide technical support for the key assumption for redredging (*i.e.*, the time required for redredging was assumed to be 50 percent of the time required to achieve the design cut). A sensitivity analysis was included to demonstrate the effect of assuming a higher or lower percentage of redredging time.

Attachment B

Comparison of October 2003 and April 2004 Engineering Performance Standards Document Structures

October 2003 Document	April 2004 Document
Executive Summary and Introduction - ALL VOLUMES	Volume 1 of 5: Statement of the Engineering Performance Standards for Dredging - NEW
Resuspension	
Section 1.0: Statement of the Performance Standard for Dredging Resuspension	Relocated to Volume 1 of 5: Statement of the Engineering Performance Standards for Dredging, Section 2.1: Performance Standard for Dredging Resuspension
Section 2.1: Background and Approach	Relocated to Volume 2 Section 1.0: Technical Background and Approach
Section 2.2: Supporting Analyses	Relocated to Volume 2 Section 2.0: Supporting Analyses
Section 2.3: Rationale for the Development of the Performance Standard	Relocated to Volume 2 Section 3.0: Rationale for the Standard
Section 3.0: Implementation of the Performance Standard for Dredging Residuals	Relocated to Volume 2 Section 4.0: Implementation of the Performance Standard for Resuspension
Section 3.1: Resuspension Criteria	Relocated to Volume 2 Section 4.1: Resuspension Criteria
Section 3.3: Monitoring Plan	Relocated to Volume 2 Section 4.2: Monitoring Plan for Compliance with the Standard
-	Volume 2 Section 4.3: Reverting to Lower Action Levels - NEW
-	Volume 2 Section 4.4: Special Studies - NEW
Section 3.4: Engineering Contingencies	Relocated to Volume 2 Section 4.5: Engineering Contingencies
Section 4.0: Plan for the Refinement of the Performance Standard for Dredging Resuspension	Relocated to Volume 1 of 5, Section 4.0: Possible Refinements to the Standards During Design and Section 6.0: Phase 1 Evaluation
Section 5.0: References	Relocated to Volume 2 Section 5.0: References
-	Volume 2 Attachment H: Estimated Cost and Feasibility of the Phase 1 Monitoring Program - NEW
Residuals	
Section 1.0: Statement of the Performance Standard for Dredging Residuals	Relocated to Volume 1 of 5: Statement of the Engineering Performance Standards for Dredging, Section 2.2: Performance Standard for Dredging Residuals
Section 2.1: Background and Approach	Relocated to Volume 3 Section 1.0: Technical Background and Approach
Section 2.2: Supporting Analyses	Relocated to Volume 3 Section 2.0: Supporting Analyses
Section 2.3: Rationale for the Development of the Performance Standard	Relocated to Volume 3 Section 3.0: Rationale for the Standard
Section 3.0: Implementation of the Performance Standard for Dredging Residuals	Relocated to Volume 3 Section 4.0: Implementation of the Performance Standard for Residuals
Section 3.1: Sample Grid Establishment Section 3.2: Sample Collection Section 3.3: Sample Management Section 3.4: Sample Analysis	Relocated to Volume 3 Section 4.1: Sample Grid Establishment Relocated to Volume 3 Section 4.2: Sample Collection Relocated to Volume 3 Section 4.3: Sample Management Relocated to Volume 3 Section 4.4: Sample Analysis
Section 3.5: Evaluation of Sample Data and Required Actions	Relocated to Volume 3 Section 4.5: Evaluation of Sample Data and Required Actions
Section 3.6: Engineering Contingencies	Relocated to Volume 3 Section 3.6: Engineering Contingencies for the Residuals Standard and Section 4.6: Subaqueous Capping
Section 4.0: Plan for the Refinement of the Performance Standard for Dredging Residuals	Relocated to Volume 1 of 5, Section 4.0: Possible Refinements to the Standards During Design and Section 6.0: Phase 1 Evaluation
Section 5.0: List of Acronyms	Relocated to be a page behind the table of contents
Section 6.0: References	Relocated to Volume 3 Section 5.0: References
-	Volume 3 Attachment B: Data Quality Objectives - NEW
-	Volume 3 Attachment C: Estimated Cost of Phase 1 Residuals Sampling Program - NEW
Productivity	
Section 1.0: Statement of the Performance Standard for Dredging Productivity	Relocated to Volume 1 of 5: Statement of the Engineering Performance Standards for Dredging, Section 2.3: Performance Standard for Dredging Productivity
Section 2.1: Background and Approach	Relocated to Volume 4 Section 1.0: Technical Background and Approach
Section 2.2: Supporting Analyses	Relocated to Volume 4 Section 2.0: Supporting Analyses
Section 2.3: Rationale for the Development of the Performance Standard	Relocated to Volume 4 Section 3.0: Rationale for the Development of the Performance Standard
Section 3.0: Implementation of the Performance Standard for Dredging Productivity	Relocated to Volume 4 Section 4.0: Implementation of the Performance Standard for Productivity
Section 3.1: Summary of the Standard	Relocated to Volume 4 Section 4.1: Productivity Threshold Criteria
Section 3.2: Potential Impact of Other Performance Standards on Productivity	Relocated to Volume 1 Section 3.0: Interactions Among the Standards
Section 3.3 Monitoring, Record Keeping an Reporting Requirements	Relocated to Volume 4 Section 4.2: Monitoring and Reporting Requirements
Section 4.0: Plan for the Refinement of the Performance Standard for Dredging Productivity	Relocated to Volume 1 of 5, Section 4.0: Possible Refinements to the Standards During Design and Section 6.0: Phase 1 Evaluation
	Section 5.0: References - NEW
Attachment 1: Example Productivity Schedule	Name Change: Attachment D: Example Productivity Schedule
Attachment 2: Example Productivity Schedule Backup	Name Change: Attachment E: Example Productivity Schedule Backup
Attachment 3: Evaluation of Applicable Dredge Equipment for the Upper Hudson River	Name Change: Attachment F: Evaluation of Applicable Dredge Equipment for the Upper Hudson River
Attachment 4: Issues Associated with Processing Full Production Volumes at the Old Moreau Landfill Candidate Processing/Transfer Facility Site	Name Change: Attachment C: Issues Associated with Processing Full Production Volumes at the Old Moreau Landfill Candidate Processing/Transfer Facility Site
	Attachment A: Evaluation of In-River Transportation - NEW
	Attachment B: Conceptual Design of On-Shore Dewatering and Water Treatment Process - NEW